



NEW JERSEY CENTER
FOR TEACHING & LEARNING

CHEM-6701: Learning and Teaching PSI Chemistry

Course Credit: 6.0 NJCTL credits

Dates & Times:

This is a 6-credit, self-paced course, covering 15 modules of content. The exact number of hours that you can expect to spend on each module will vary based upon the module coursework, as well as your study style and preferences. You should plan to spend 6-12 hours per module, completing the module slides, readings, short answer assignments, labs, mastery exercises, practice problems, and module exams.

Graduate Student Handbook: <https://njctl.org/graduate-handbook/>

COURSE DESCRIPTION:

This introductory course is for teachers to learn the content of PSI Chemistry and how to teach that course to students. The student course is designed to be taught to introductory chemistry students who have taken algebra-based physics prior to this course. This is a mathematically rigorous chemistry course that builds upon foundational topics in physics and leads to a better understanding of biology. Topics include atomic structure, periodic trends, bonding, chemical reactions, stoichiometry, properties of matter and solutions, kinetics and equilibrium and organic compounds.

STUDENT LEARNING OUTCOMES:

Upon completion of the course, the student will be able to:

1. Demonstrate master of Chemistry on a comprehensive exam.
2. Demonstrate mastery of pedagogical content knowledge for teaching Chemistry.
3. Identify, understand, and communicate the elements, representations, and models of scientific phenomena to solve scientific problems.
4. Explain that the chemical elements are the fundamental building materials of matter, and all matter can be understood in terms of arrangements of atoms. These atoms retain their identity in chemical reactions.

5. Describe that the chemical and physical properties of materials can be explained by the structure and the arrangement of atoms, ions, or molecules and the forces between them. Changes in matter involve the rearrangement and/or reorganization of atoms and/or the transfer of electrons.
6. Understand how the laws of thermodynamics describe the essential role of energy and explain and predict the direction of changes in matter.

TEXTS, READINGS, INSTRUCTIONAL RESOURCES:

Required Texts:

- PSI Chemistry uses a free digital text book accessible at:
<https://njctl.org/courses/science/chemistry/>
- Participants will download SMART Notebook presentations, homework files, labs, and teacher resources from the PSI Algebra-Based Physics Course

Recommended Texts:

Cobb, C, Fetterolf, M. (2010). *The Joy of Chemistry: The Amazing Science of Things*. Amerherst, NY: Prometheus Books. ISBN-13: 978-1591027713

Holton, G. J., Brush, S. G., & Holton, G. J. (2001). *Physics, the Human Adventure: From Copernicus to Einstein and Beyond*. New Brunswick, N.J: Rutgers University Press. ISBN-13: 9780813529080

COURSE REQUIREMENTS:

Consistent attendance in your online courses is essential for your success. Failure to verify your attendance within the first 7 days of this course may result in your withdrawal. If for some reason you would like to drop a course, please contact your advisor.

Online classes have assignments and participation requirements just like on-campus classes. Budget your time carefully. If you are having technical problems, problems with your assignments, or other problems that are impeding your progress, let your instructor know as soon as possible.

GRADE DISTRIBUTION AND SCALE:

In order to receive a Passing grade, the participant must complete the following course requirements: all short answer assignments, mastery exercises, labs, exams, and the reflection paper outlined in the *Assignments* section of the Class Schedule (below).

Grade Distribution:

Module Exams	70%
Final Exam	10%
Labs	6%
Short Answer Assignments	6%
Mastery Exercises	6%
Reflection Paper	2%

Grade Scale:

A	93 – 100
A-	90 – 92
B+	86 – 89
B	83 – 86
B-	80 – 82
C+	77 – 79
C	73 – 76
C-	70 – 72
D	60.0 – 69.9
F	59.9 or below

ACADEMIC STANDING:

NJCTL has established standards for academic good standing within a student's academic program. Students enrolled in any NJCTL online course must receive an 80 or higher to successfully complete a course and receive credit for that course. An 80 is equivalent to a GPA of 2.7 or B-. Additionally, students in an endorsement program must receive a cumulative GPA of 3.0 for all courses combined in order to successfully complete the program.

ACADEMIC INTEGRITY:

Students must assume responsibility for maintaining honesty in all work submitted for credit and in any other work designated by the instructor of the course. Academic dishonesty includes cheating, fabrication, facilitating academic dishonesty, plagiarism, reusing /re-purposing your own work, unauthorized possession of academic materials, and unauthorized collaboration.

CITING SOURCES WITH APA STYLE:

All students are expected to follow proper writing and APA requirements when citing in APA (based on the APA Style Manual, 6th edition) for all assignments.

DISABILITY SERVICES STATEMENT:

We are committed to providing reasonable accommodations for all persons with disabilities. Any student with a documented disability requesting academic accommodations should contact the Dean of Students, Dr. Jamie Korn, additional information to coordinate reasonable accommodations for students with documented disabilities (Jamie@njctl.org).

NETIQUETTE:

Respect the diversity of opinions among the instructor and classmates and engage with them in a courteous, respectful, and professional manner. All posts and classroom communication must be conducted in accordance with the student code of conduct. Think before you push the Send button. Did you say just what you meant? How will the person on the other end read the words?

Maintain an environment free of harassment, stalking, threats, abuse, insults or humiliation toward the instructor and classmates. This includes, but is not limited to, demeaning written or oral comments of an ethnic, religious, age, disability, sexist (or sexual orientation), or racist nature; and the unwanted

sexual advances or intimidations by email, or on discussion boards and other postings within or connected to the online classroom.

If you have concerns about something that has been said, please let your instructor know.

CLASS SCHEDULE:

Module	Required Readings	Assignments
0 – Optional Physics Review	<ul style="list-style-type: none"> Optional presentations 	<ul style="list-style-type: none"> None
1 – Atomic Origins	<ul style="list-style-type: none"> Ch. 15 in <i>Physics, the Human Adventure</i> Intro and Ch. 1-1 in <i>The Joy of Chemistry</i> 	<ul style="list-style-type: none"> Short Answer Assignment Lab Mastery Exercise Module Exam
2 – Atomic Structure	<ul style="list-style-type: none"> Ch. 20 in <i>Physics, the Human Adventure</i> 	<ul style="list-style-type: none"> Short Answer Assignment Lab Mastery Exercise Module Exam
3 – The Periodic Table	<ul style="list-style-type: none"> Ch. 21 in <i>Physics, the Human Adventure</i> Ch. 1-2 in <i>The Joy of Chemistry</i> 	<ul style="list-style-type: none"> Short Answer Assignment Lab Mastery Exercise Module Exam
4 – Ionic Bonding & Ionic Compounds	<ul style="list-style-type: none"> Ch. 1-5 and 1-6 in <i>The Joy of Chemistry</i> 	<ul style="list-style-type: none"> Short Answer Assignment Lab Mastery Exercise Module Exam
5 – Covalent Bonding & Molecular Compounds	<ul style="list-style-type: none"> Ch. 1-7 and 1-8 in <i>The Joy of Chemistry</i> 	<ul style="list-style-type: none"> Short Answer Assignment Lab Mastery Exercise Module Exam
6 – Intermolecular Forces	<ul style="list-style-type: none"> Ch. 1-13 and 1-14 in <i>The Joy of Chemistry</i> 	<ul style="list-style-type: none"> Short Answer Assignment Lab Mastery Exercise Module Exam

7 – Mole Calculations	Ch. 1-10 in <i>The Joy of Chemistry</i>	<ul style="list-style-type: none"> • Short Answer Assignment • Lab • Mastery Exercise • Module Exam
8 – Chemical Reactions	<ul style="list-style-type: none"> • Ch. 1-2 and 1-3 in <i>The Joy of Chemistry</i> 	<ul style="list-style-type: none"> • Short Answer Assignment • Lab • Mastery Exercise • Module Exam
9 - Stoichiometry	<ul style="list-style-type: none"> • Ch. 1-11 in <i>The Joy of Chemistry</i> 	<ul style="list-style-type: none"> • Short Answer Assignment • Lab • Mastery Exercise • Module Exam
10 - Gases	<ul style="list-style-type: none"> • Ch. 1-12 in <i>The Joy of Chemistry</i> 	<ul style="list-style-type: none"> • Short Answer Assignment • Lab • Mastery Exercise • Module Exam
11 – Thermochemistry Part 1	<ul style="list-style-type: none"> • Ch. 22 in <i>Physics, the Human Adventure</i> 	<ul style="list-style-type: none"> • Short Answer Assignment • Lab • Mastery Exercise • Module Exam
12 - Thermochemistry Part 2	<ul style="list-style-type: none"> • Ch. 18 in <i>Physics, the Human Adventure</i> 	<ul style="list-style-type: none"> • Short Answer Assignment • Lab • Mastery Exercise • Module Exam
13 – Acids & Bases	<ul style="list-style-type: none"> • Ch. 1-4 in <i>The Joy of Chemistry</i> 	<ul style="list-style-type: none"> • Short Answer Assignment • Lab • Mastery Exercise • Module Exam
14 – Kinetics & Equilibrium	<ul style="list-style-type: none"> • Ch. 1-15 in <i>The Joy of Chemistry</i> 	<ul style="list-style-type: none"> • Short Answer Assignment • Lab • Mastery Exercise • Module Exam
15 - Reflection	<ul style="list-style-type: none"> • Review topics as desired in <i>The Joy of Chemistry and Physics, the Human Adventure</i> (recommended) 	<ul style="list-style-type: none"> • Reflection Paper • Module Exam